

Chapter 4 Population Ecology

4.1 Population dynamics

I. Population characteristics

→ all species occur in groups called populations

A. Population density - # of organisms per unit area

B. Spatial distribution

1. Dispersion - the pattern of spacing of a population within an area

a. Three main types of dispersion:

clumped (groups), random, and uniform

C. Population Ranges - distribution of species in habitats

II Population-limiting factors

A. Limiting factors are abiotic or biotic in nature

1. Limiting factors keep populations from increasing indefinitely

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2. Density - dependent - a factor in an environment that depends on population size

a. ex: disease, predation

b. Disease - occurs when pop. is too high

c. Competition increases as pop. increases

d. Parasites can limit population growth

3. Density - independent - factor in an environment that does not depend on pop. size

B. Population growth rate - (PGR) explains how fast a population can grow

C. Mathematical Models for population growth

1. Exponential Growth → J curve

2. Logistic Growth → S curve

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- D. Carrying Capacity - the maximum population size of a given species in a certain area
1. Limited by H_2O , O_2 , energy, and nutrients

E. Reproductive Patterns

1. R-strategists - adapt for living in an environment where fluctuation in biotic/abiotic factors occurs
 - a. have short life spans + produce many offspring
2. K-strategist - adapted for living in an environment where little fluctuation occurs in biotic/abiotic factors occurs
 - a. K-strategist generally have longer life spans and have fewer offspring in which they invest more energy in to

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4.2 Human Population Growth

I. Demography

A. The study of human population size, density, distribution, movement, and birth+death rates

B. Projected Growth of Human Pop.

1. 1999 = 6 billion, 2012 = 7 billion
 - a. Projected: 2050 - 9 billion

C. Technological Advances

1. For thousands of year, environment has limited human carrying capacity
2. Agricultural Revolution most important technological revolution in human history
3. Modern Technology has prevented and can treat disease

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- D. Human pop. growth rate
1. Human pop. growth rate is decreasing
 - a. Disease (AIDS + voluntary population control)
- II Trends in Human Pop. Growth Rate (PGR)
- A. Changes from high birth rate + death rates to low birth/death rates = demographic transition
 - B. Human Pop. Growth Rate % (for thousand)

$$= \frac{\text{Birthrate} - \text{deathrate} + \text{migration}}{10}$$
 - C. Zero pop growth
 1. occurs when birth + immigration rates = death + emigration rates
 - D. Age Structure
 1. Number of males + females in each age group
 - a. Pre-reproductive (<20 or less)
 - b. Reproductive (20-44)
 - c. Post-reproductive (44+)
 - E. Human Carrying Capacity
 1. Resource availability does affect human growth rate + carrying capacity
→ Figure 17 in book
 2. Human population growth/carrying capacity is not currently defined

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